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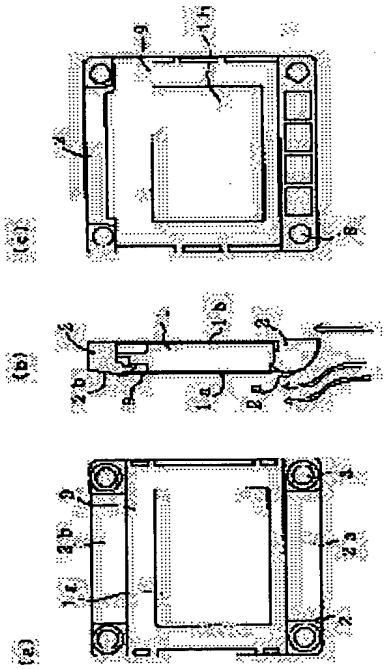
(71)Applicant : SHARP CORP
(72)Inventor : INUI TADASHI
TAKATO YUTAKA

(54) DISPLAY ELEMENT AND PROJECTION LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a display element enabling to heighten cooling efficiency of a display panel with a shape suited for miniaturization.
SOLUTION: The display element is provided with the display panel 1 and a frame 2 to hold the peripheral part of the display panel 1. The frame 2 is provided with a guiding part 2a to guide cooling air supplied to the peripheral part of the display panel 1 to surfaces 1a, 1b of the display panel 1.



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CLAIMS

[Claim(s)]
[Claim 1] It is the display device which has the advice section to be the display device which has a display panel and a frame holding the periphery section of said display panel, and for said frame lead the cooling wind supplied towards the periphery section of said display panel to the front face of said display panel.
[Claim 2] Said frame is a display device according to claim 1 characterized by not having substantially the part which bars the flow of the cooling style which goes to the front face of a projection and said display panel toward an outside from the front face of said display panel.
[Claim 3] At least said part of the cooling style is a display device according to claim 1 or 2 led to the front face of said display panel while moving so that said slideway may be met including the slideway formed so that said advice section might incline from the front face of said display panel in succession substantially with the front face of said display panel.
[Claim 4] Said frame is equipped with the 2nd advice section prepared so that it might counter with said advice section on both sides of said display panel. Said 2nd advice section The 2nd slideway formed so that it might incline from the front face of said display panel is included in succession as substantially as the front face of said display panel. By this The display device according to claim 3 by which it is prevented that said cooling wind piles up by flowing so that said 2nd slideway may be met after at least said part of the cooling style passes through the front face of said display panel.
[Claim 5] Said slideway is a display device including the curved surface of a cross-section approximate circle arc formed so that it might extend from the front face of said display panel according to claim 3 or 4.
[Claim 6] A display device given in either of claims 3-5 which have two or more wings prepared in said slideway along the direction where said cooling wind flows.
[Claim 7] A display device given in either of claims 3-6 further equipped with the member which specifies opening for said cooling wind to flow [to be arranged so that a clearance may be formed between the front face of said display panel, and the slideway of said frame, and] into the front face of said display panel.
[Claim 8] The display device according to claim 4 further equipped with the member which specifies opening which discharges the cooling wind which absorbed the heat which has been arranged so that a gap may be formed between the front face of said display panel, and the 2nd slideway of said frame, and was accumulated in said display panel.
[Claim 9] The member which specifies said opening is the display device according to claim 7 or 8 which is prepared so that the circumference part of said display panel may be covered selectively, and can shade the circumference part of said display panel.
[Claim 10] Said advice section is a display device given in either of claims 1-9 which can lead a cooling wind to the both-sides front face of said display panel.
[Claim 11] A display device given in either of claims 1-10 characterized by having had further the flexible substrate with which wiring for transmitting an electrical signal to said display panel was prepared, and preparing opening in said flexible substrate.
[Claim 12] Said display panel is a display device given in either of claims 1-11 equipped with the liquid crystal layer pinched by the substrate of a couple, and the substrate of said couple.
[Claim 13] The projection mold liquid crystal display which equips the display panel of a display device according to claim 12 and said display device with the light source for irradiating light, and the air blasting means for generating said cooling wind.
[Claim 14] Said air blasting means is a projection mold liquid crystal display according to claim 13 which is arranged under said display device and supplies a cooling wind towards the periphery section of said display device.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] More specifically, this invention relates to the display device which can raise the cooling effectiveness of a display panel about the image display component suitable for the activity to a projection mold image display device.
[0002]
[Description of the Prior Art] From the former, the projection mold image display device (liquid crystal projector) constituted using the liquid crystal panel of a transparency mold is known. The liquid crystal projector has which outstanding description with unnecessary small and measuring with the wide color reproduction range, and convergence adjustment as compared with the projection mold image display device which uses CRT.
[0003] In a liquid crystal projector, the light from the light source is irradiated effective in a liquid crystal panel using the optical system of a reflecting mirror etc. The high power light sources, such as a xenon lamp and a metal halide lamp, are used for the light source, and the brightness of the image on which it is projected by the screen is raised by using the light source which emits such a powerful light.
[0004] The light from the light source has the filter which cuts a heat ray (infrared radiation) usually let it pass, and unnecessary infrared radiation is removed by this. However, though infrared radiation was cut, if a beam of light continuously strong against a liquid crystal panel is irradiated, quite big generation of heat will arise in a liquid crystal panel. In the surface center section of the liquid crystal panel, it concentrates by the variation in exposure luminous-intensity distribution etc., and especially generation of heat becomes the cause which causes various evils (lowering of contrast, generating of display nonuniformity, etc.).
[0005] For this reason, the cooler style for cooling a liquid crystal panel is prepared in the liquid crystal projector. The air-cooling device which sends a cooling wind to a liquid crystal panel, using an electric fan as this cooler style is known. The equipment which sends the cooling wind from a fan to a liquid crystal panel through the light guiding pipe which forms an optical path is indicated by JP,64-29071,A. With this equipment, even a liquid crystal panel draws the wind generated by the fan located in the location distant from the liquid crystal panel, and it is cooling by hitting this on the surface of a liquid crystal panel.
[0006] Moreover, in the projector of 3 plate type equipped with the liquid crystal panel of three sheets for R (red), G (green), and B (blue) etc., the configuration which prepared the fan for air cooling under the liquid crystal panel is known. The wind from a fan is supplied towards near the bottom end-face section of a liquid crystal panel from air blasting opening prepared directly under the liquid crystal panel. In this configuration, a cooling wind flows upwards, taking the heat on the front face of a liquid crystal panel, and a liquid crystal panel is cooled by this.
[0007] When the cooler style of these air cooling was used conventionally, the comparatively large space for passing a cooling wind was prepared around the liquid crystal panel. If it does in this way, the air capacity of the cooling style which flows near a liquid crystal panel can be made to increase, and it will become possible to cool a liquid crystal panel more effectively.
[0008] Thus, by cooling the front face of a liquid crystal panel, the temperature of the liquid crystal panel circumference can be maintained at the comparatively low temperature for example, around about 50 degrees C, too much temperature up can be prevented, and a liquid crystal panel can be operated appropriately.
[0009]
[Problem(s) to be Solved by the Invention] On the other hand, recently, the needs to the miniaturization of a projection mold image display device have been increasing from points, such as a mobile-oriented response, by making development of an electronic technique into a background. As a liquid crystal panel, the micro display which has the size of less than 1 inch of vertical angles is also developed, and it is thought that the miniaturization of a liquid crystal projector will progress further from now on.
[0010] However, it becomes difficulty more to cool a liquid crystal panel as the miniaturization of a liquid crystal projector is advanced. In the circumference of a liquid crystal panel, it is because it becomes difficult to secure the space which serves as a path the passage of the cooling style.
[0011] In the projector of 3 plate type which has the configuration which has arranged the liquid

crystal panel of three sheets for R (red), G (green), and B (blue) around a dichroic prism especially, compared with the projector of a veneer type, optical system is complicated, and since there are many components mark, it is not desirable to prepare excessive space in the liquid crystal panel circumference, when realizing the miniaturization of equipment. In the liquid crystal projector of 3 plate type, it becomes a neck to the miniaturization of equipment to secure big space around a dichroic prism.

[0012] In order to raise the cooling effectiveness in air cooling, the equipment which attached radiator material (condensator) in the liquid crystal panel is indicated by JP,8-211390,A. However, since this conventional technique also adds the condensator formed from a metal frame etc. to a liquid crystal panel to an excess, the case of not being suitable for the miniaturization of equipment may produce it. Although it is thought that the gap between the front face of a liquid crystal panel and other members which adjoin this becomes very narrow when the miniaturization of equipment is promoted, in this case, the flow of the cooling style is blocked by the condensator attached in the panel, and there is a possibility that cooling effectiveness may fall on the contrary.

[0013] In addition, although making the output of an air blasting machine increase and sending the high wind of the rate of flow is also considered in order to raise cooling effectiveness, the problem that the noise made by the wind becomes large in this case arises. The application in a quiet location is expected, and if a liquid crystal projector is in the time which attaches importance to comfortable amenity, it is a technical problem also with important also reducing the noise.

[0014] Moreover, when it is required that the brightness of the image on which it is projected by the screen should be raised, it is necessary to heighten the output of the light source, and it becomes important to raise the cooling effectiveness of a liquid crystal panel also in this case. Since calorific value increases by the factor of the square of a light source output, it becomes impossible to operate a liquid crystal panel appropriately, when cooling effectiveness is low.

[0015] This invention is made in view of these many points, and the main object is a gestalt suitable for a miniaturization, and is to offer the display device which can raise the cooling effectiveness of a display panel.

[0016] Other objects of this invention are to offer the projection mold liquid crystal display equipped with the above-mentioned display device.

[0017]

[Means for Solving the Problem] The display device by this invention is a display device which has a display panel and a frame holding the periphery section of said display panel, and said frame has the advice section for leading the cooling wind supplied towards the periphery section of said display panel to the front face of said display panel.

[0018] In a desirable operation gestalt, said frame does not have substantially the part which bars the flow of the cooling style which goes to the front face of a projection and said display panel toward an outside from the front face of said display panel.

[0019] In a desirable operation gestalt, at least said part of the cooling style is led to the front face of said display panel including the slideway formed so that said advice section might incline from the front face of said display panel in succession substantially with the front face of said display panel, moving so that said slideway may be met.

[0020] In a desirable operation gestalt said frame It has the 2nd advice section prepared so that it might counter with said advice section on both sides of said display panel. Said 2nd advice section The 2nd slideway formed so that it might incline from the front face of said display panel is included in succession as substantially as the front face of said display panel. By this After at least said part of the cooling style passes through the front face of said display panel, it is prevented by flowing so that said 2nd slideway may be met that said cooling wind piles up.

[0021] In a desirable operation gestalt, said slideway includes the curved surface of a cross-section approximate circle arc formed so that it might extend from the front face of said display panel in an operation gestalt.

[0022] In a certain operation gestalt, it has two or more wings prepared along the direction where said cooling wind flows in said slideway.

[0023] In a certain operation gestalt, it is arranged so that it may have a gap between the front face of said display panel, and the slideway of said frame, and it has further the member which specifies opening for said cooling wind to flow into the front face of said display panel.

[0024] In a certain operation gestalt, it is arranged so that it may have a gap between the front face of said display panel, and the 2nd slideway of said frame, and it has further the member which specifies opening which discharges the cooling wind which absorbed the heat accumulated in said

display panel.
[0025] In a desirable operation gestalt, the member which specifies said opening is prepared so that the circumference part of said display panel may be covered selectively, and it can shade the circumference part of said display panel.
[0026] In a certain operation gestalt, said advice section can lead a cooling wind to the both-sides front face of said display panel.
[0027] In a certain operation gestalt, it has further the flexible substrate with which wiring for transmitting an electrical signal to said display panel was prepared, and is characterized by preparing opening in said flexible substrate.
[0028] Said display panel is equipped with the liquid crystal layer pinched by the substrate of a couple, and the substrate of said couple in a desirable operation gestalt.
[0029] The projection mold liquid crystal display of this invention is equipped with the display device of one of the above, the light source for irradiating light at the display panel of said display device, and the air blasting means for generating said cooling wind.
[0030] In a desirable operation gestalt, said air blasting means is arranged under said display device, and supplies a cooling wind towards the periphery section of said display device.
[0031]
[Embodiment of the Invention] this invention person considered flowing at the time of supplying a cooling wind from the lower part of a display panel for the purpose of cooling the front face of the display panel of a transparency mold efficiently on the assumption that the miniaturization of a projection mold display of the cooling style in the detail. As mentioned above, on a projection mold display, it is because cooling efficiently as little the front face (especially center section) of the display panel with which especially generation of heat therefore poses a problem in the style of cooling as possible thought that it was important when realizing the miniaturization of equipment from it not being desirable to use a high power fan.
[0032] Consequently, it turned out that the flow of the cooling style [the configuration of a frame of holding the periphery section of a display panel] may be affected, and the cooling effectiveness on the front face of a display panel may fall by this. Here, a frame points out the member which holds a display panel in the periphery section of a display panel, and while protecting the periphery section of the display panel constituted using a glass substrate etc., since a display panel is fixed to a position, it may be used.
[0033] If the field has big curvature in case a cooling wind passes along a predetermined field, an eddy (breakaway) will occur. Moreover, also when a cooling wind hits the field established at the include angle of 90 degrees to the track, turbulence of air currents, such as an eddy, occurs. At this time, a sound is also generated with an eddy. Thus, if the flow of the cooling style worsens, cooling effectiveness will fall and will also produce the increment in the noise with it.
[0034] The decline in the cooling effectiveness based on such a frame configuration is having not become a problem in the projection mold display constituted so that a blower's might be formed, and might get down to the place distant from the display panel and a wind's might be sent to the front face of a display panel. Moreover, the dimension of a projection mold display is comparatively large, and it is having not become a big problem in the equipment which has secured the space of sufficient size for the perimeter of a display panel.
[0035] According to the experiment of this invention person, in a frame configuration as shown in drawing 11 (a), a part of wind supplied towards the end face (periphery section) of a display panel 90 does not flow smoothly on the surface of a panel by hitting a frame 92, but an eddy is formed, and, thereby, cooling effectiveness falls. Moreover, the increment in the noise is also produced by forming a vortex.
[0036] Moreover, in a frame configuration as shown in drawing 11 (b), the part 94 (about 1.5mm) which projects toward an outside from a panel front face will block the flow of the cooling style which goes to a panel front face. Thereby, the effectiveness that a cooling wind takes the heat on the front face of a panel decreases, and the noise also increases according to the vortex generated in the projecting part.
[0037] From these things, this invention person decided to adopt the configuration of a frame where a cooling wind can be positively drawn for the cooling wind which flows near a frame when supplying a cooling wind towards the end-face section of a display panel on the surface of a display panel. As for the end-face section of a frame, it is desirable to have a configuration which serves as low resistance to the flow of a wind. Moreover, it is desirable not to prepare substantially the part which projects on the outside of a display panel in a frame. In a frame, the part which projects from

a display panel is set as about 0.3mm or less. Thus, without using a large-sized fan, it was able to become possible to cool the front face of a display panel effectively, and cooling effectiveness was able to be raised with the gestalt suitable for the miniaturization of equipment.

[0038] In addition, although it has the configuration made it easier to flow a cooling wind on a panel front face and cooling effectiveness is raised by it, the display device of this invention can also be used combining the configuration of others which may raise the cooling effectiveness on the front face of a panel, as long as this effectiveness is acquired.

[0039] Hereafter, the operation gestalt of this invention is explained, referring to a drawing.

[0040] (Operation gestalt 1) Drawing 1 is drawing showing the whole liquid crystal projector 100 configuration of the operation gestalt 1.

[0041] a liquid crystal projector 100 -- the circumference of a dichroic prism 20 -- setting -- liquid crystal display component 10R for red, and the object for green -- it is constituted as a liquid crystal projector of 3 plate type in which liquid crystal display component 10G and liquid crystal display component 10B for blue were prepared.

[0042] In a liquid crystal projector 100, the light (white light) emitted from the light source 11 formed from a metal halide lamp etc. passes the heat ray cut-off filter 12 which cuts a heat ray, and excessive infrared radiation is removed here. After the light which passed the heat ray cut-off filter 12 passes a polarization beam splitter 13, it is decomposed into a light in three primary colors by dichroic mirror 14B in which only dichroic mirror 14G in which only dichroic mirror 14R which makes only red light penetrate selectively, and green light are reflected selectively, and blue glow are reflected selectively.

[0043] Thus, the light of each decomposed color passes along the incidence side polarizing plates 16R, 16G, and 16B prepared corresponding to each, and incidence is carried out to each liquid crystal display components 10R, 10G, and 10B.

[0044] After the light of each color modulated based on image information in each liquid crystal display components 10R, 10G, and 10B passes the outgoing radiation side polarizing plates 18R, 18G, and 18B, it is combined with a dichroic prism 20 and incidence of it is carried out to the projection lens 22. In the screen (un-illustrating) formed ahead [the], image formation of the light which came out of the projection lens 22 is carried out, and, thereby, a desired image is displayed.

[0045] In addition, the layout of the optical system of a liquid crystal projector 100 mentioned above may be the same as that of it of the conventional liquid crystal projector.

[0046] Drawing 2 is the sectional view showing the circumference of a dichroic prism 20. In the liquid crystal projector 100, the liquid crystal display component 10 sets caudad, and the cooling fan 30 is formed. A cooling fan 30 can be rotated by driving gears, such as a motor, and can generate the cooling wind which flows upwards by this. In addition, the wind introduction section 36 equipped with the filter under the cooling fan 30 is formed, and the open air can be incorporated from the exterior of the aluminum chassis 38 which fixes an optical unit. As a fan 30, it is NIDEC, for example. D06T-12TS2 made from CORPORATION 02B11 (DC12V, 0.28mA) can be used.

[0047] The cooling wind generated by the fan 30 is supplied towards the bottom end face of the liquid crystal display component 10 from the opening 34 prepared in the wind guide plate 32. A cooling wind can flow upwards the comparatively narrow space (for example, space with a width of face of about 3mm) formed between the incidence side front face of the liquid crystal display component 10, and a polarizing plate 16, taking the heat of the front face of the liquid crystal display component 10, and can carry out air cooling of the liquid crystal display component 10.

[0048] Since such a configuration can supply a cooling wind from the place near a liquid crystal panel, it is suitable for cooling a liquid crystal display component in the projector of the above 3 plate types.

[0049] Moreover, the flexible substrate 40 with which wiring for transmitting a signal was prepared is connected to the liquid crystal display component 10. The other end of the flexible substrate 40 is connected to the connection terminal 44 of the circuit which drives a display device 10. Thus, actuation of the liquid crystal display component 10 is controllable by giving a predetermined electrical signal to the liquid crystal display component 10 from an actuation circuit through the connection terminal 44 and the flexible substrate 40.

[0050] In addition, as shown in drawing 9 , opening 42 may be formed in the flexible substrate 40. The cooling wind which absorbed heat from liquid crystal panel 10 front face is promptly discharged through this opening 42 outside, and, thereby, can prevent the stagnation of the cooling style in near a liquid crystal display component, and generating of a turbulent flow. Consequently, cooling effectiveness can be raised.

[0051] Drawing 3 shows the configuration of the liquid crystal display component 10. The liquid crystal display component 10 consists of a liquid crystal panel 1 and a frame 2 holding the periphery of this liquid crystal panel 1. On optical incidence side surface 1a of a liquid crystal panel 1, and optical outgoing radiation side surface 1b, the gobo 9 for preventing the optical leakage in fields other than a viewing area is formed, respectively. The gobo 9 is formed of the resin metallurgy group etc., for example, has the thickness of about 0.15mm - about 0.25mm.

[0052] As a liquid crystal panel 1, the conventional transparency mold liquid crystal panel can be used. A liquid crystal panel 1 has the structure where the liquid crystal layer was pinched between the glass substrates of a couple. The size of a liquid crystal panel 1 is 0.7-1.3 inches of vertical angles, and is 4mm - about 6mm in thickness. In a liquid crystal panel 1, an electrical potential difference is impressed to a liquid crystal layer using the transparence thin film electrodes (for example, pixel electrode which makes the letter of a matrix formed from the indium stannic acid ghost) formed on the glass substrate of a couple, and a display is performed by changing the optical property of a liquid crystal layer.

[0053] The frame 2 is formed from resin etc. and can protect the periphery section of a liquid crystal panel 1 appropriately. Moreover, the connecting means of the installation hole 3 etc. is established, and it is used for a frame 2 in case a liquid crystal panel 1 is fixed to a position to a dichroic prism etc.

[0054] In this operation gestalt, ramp 2a which forms the curved surface which makes the shape of cross-section radii is formed in the soffit section of a frame 2. Thus, the cooling wind supplied towards the periphery section of a liquid crystal panel 1 by the field ("the field formed so that it might incline" shall also include such a curved surface in this description in addition) formed so that it might incline from the front face of a liquid crystal panel 1 is smoothly led to surface 1a of a liquid crystal panel. Since the cooling wind which passes near the ramp 2a flows without receiving strong resistance as ramp 2a is met, it is prevented that the eddy which therefore is not a request is formed in the style of cooling.

[0055] Moreover, ramp 2b which inclines from panel surface 1a is formed in the upper bed section of a frame 2. Thereby, since the cooling wind which took heat from incidence side surface 1a of a liquid crystal panel leaves panel surface 1a promptly along with ramp 2b, it can prevent that the stagnation (whorl) of the cooling style arises. Thereby, generating of a sound can also be prevented while a liquid crystal panel 1 is cooled efficiently.

[0056] moreover, the part into which a frame 2 projects from the front face of a liquid crystal panel 1 -- substantial -- not having -- cooling -- a style -- abbreviation -- he is trying to flow along a flat field As for a frame 2, it is desirable not to include the part which projects 0.265mm or more from surface 1a of a liquid crystal panel. In addition, on these descriptions, although few level differences may be formed between the front face of a frame 2, and surface 1a of a liquid crystal panel 1, if a level difference is 0.3mm or less, I will think that these form the flat field which continues substantially.

[0057] Thus, it becomes possible to supply the quick cooling wind of flow comparatively on the surface of a liquid crystal panel, preventing generating of a sound, if a frame is formed so that resistance may become low to the flow of the cooling style. Therefore, the deployment of the cooling style can be aimed at, cooling effectiveness can be raised, and a liquid crystal panel can be cooled to homogeneity.

[0058] In addition, he is trying for light to lead many of the cooling style from a fan to panel surface 1a of the side which carries out incidence by making the dip direction of ramp 2a into an one direction with this operation gestalt. This is because it is effective to cool preponderantly surface 1a by the side of this elevated temperature since the temperature of surface 1a by which the light from the light source is irradiated directly becomes higher.

[0059] However, when the liquid crystal display component 10 is attached in the device for positioning (chassis), it is hard coming to cool outgoing radiation side surface 1b, and the temperature of outgoing radiation side surface 1b can become an elevated temperature comparatively. In this case, you may make it lead a cooling wind to both the front faces 1a and 1b of a panel at a desired rate (for example, by one half) along with incidence lateroversion pars-obliqua 4a and outgoing radiation lateroversion pars-obliqua 4b using the frame 4 as shown in drawing 4 . Thus, if the configuration of a frame is chosen appropriately and the flow of the cooling style is controlled according to the temperature on the front face of both sides of a liquid crystal panel, the whole liquid crystal panel can be cooled more effectively.

[0060] (Operation gestalt 2) Drawing 5 shows the liquid crystal display component of the operation gestalt 2. In the soffit section (ramp 2a) of a frame 2, the point that the liquid crystal display

component of the operation gestalt 2 differs from the liquid crystal display component of the operation gestalt 1 is that two or more wings 5 are formed, as the flow direction of the cooling style is met.

[0061] By forming such a wing 5, the flow of the cooling style supplied to ramp 2a from the fan is stabilized, and a wind can be sent to a liquid crystal panel at homogeneity. Moreover, when a cooling wind hits a wing 5, a small eddy may occur. Consequently, the wind which heat with a wave tends to take on the surface of a liquid crystal panel can be passed.

[0062] Moreover, in order to radiate heat also from a wing 5 in the heat accumulated in the liquid crystal panel 1 or the frame 2 by forming such a wing 5, the effectiveness which carries out air cooling of the liquid crystal display component increases.

[0063] Such a device is advantageous when heightening the cooling effect in the liquid crystal display component which has comparatively big size.

[0064] (Operation gestalt 3) Drawing 6 shows the liquid crystal display component of the operation gestalt 3. The point that the liquid crystal display component of the operation gestalt 3 differs from the liquid crystal display component of the operation gestalt 1 is that the clearance is formed between a gobo 6 and panel surface 1a, and the gobo 6 is prolonged to a wrap location in inclined plane 2a of a frame, and 2b. In such a configuration, opening 6a for the cooling wind from a fan to flow into the front face of a liquid crystal panel by the gobo 6 and inclined plane 2a is specified. Moreover, opening 6b which the cooling wind which took heat from the front face of a liquid crystal panel discharges with a gobo 6 and inclined plane 2b is specified.

[0065] A gobo 6 is supported by the supporters 2c and 2d which projected from the frame 2. However, as shown in drawing 6 (c), supporter 2c is formed in the location which does not bar the flow of the cooling style which goes to a panel front face, and space 6a which a cooling wind passes is secured. In addition, it is constituted like [2d of supporters] supporter 2c.

[0066] Thus, a cooling wind may be able to be more effectively drawn on the surface of a panel by constituting the admission port of the cooling style as opening 6a into which it was inserted by the gobo 6 and ramp 2a of a frame. For example, when using the quick air of the rate of flow compressed beforehand as a means to supply a cooling wind, the air current (cooling wind) of the high speed which is easy to take heat which crawls on near a panel front face can be formed by letting such clearance 6a pass. Moreover, the gobo 6 extended as mentioned above can do so the effectiveness as a wall of making the cooling wind which it is going to separate from a panel front face toward an outside going to a panel front face compulsorily, in near ramp 2a.

[0067] Moreover, the heat accumulated in the liquid crystal panel 10 may be emitted by the air current which flows opening 6b by preparing opening 6b specified with a gobo 6 and inclined plane 2b. It is because the heat with which the air current which this produces by near opening 6b serving as negative pressure according to the air current which flows the outside of a gobo 6 was accumulated in the liquid crystal panel may be taken. Such effectiveness is especially considered to be large, when using the quick air of the rate of flow compressed beforehand.

[0068] (Operation gestalt 4) Drawing 7 shows the liquid crystal display component of the operation gestalt 4. The liquid crystal display component shown in drawing 7 is realized by combining the configuration (drawing 5) which has the wing 5 explained with the above-mentioned operation gestalt 2, and the configuration (drawing 6) which prepares a clearance between the gobos 6 and frames 2 which were explained with the above-mentioned operation gestalt 3.

[0069] With the liquid crystal display component of the operation gestalt 4, the wind which is made to generate a small eddy and heat tends to take can be supplied on the surface of a liquid crystal panel, stabilizing the flow of the cooling style by having formed the wing 5. Since a cooling wind can be supplied with this through opening 6a between a gobo 6 and ramp 2a of a frame, when using the compressed air, the air current (cooling wind) of the high speed which is easy to take heat which crawls on near a panel front face can be supplied.

[0070] Thus, the display device of this invention may be constituted by combining the configuration of each operation gestalt, and can do multiplication-effectiveness so. For example, in the ramps 4a and 4b constituted so that a cooling wind might be supplied to panel both sides as shown in drawing 4 , it is also possible to form the wing 5 shown in drawing 5 .

[0071] (Operation gestalt 5) Drawing 8 shows the liquid crystal display component of the operation gestalt 5. While constituting the ramps 4a and 4b of a frame from a liquid crystal display component of the operation gestalt 5 so that a cooling wind may be led to both the front faces 1a and 1b of a liquid crystal panel, in each of incidence side surface 1a of a liquid crystal panel, and outgoing radiation side surface 1b, only a predetermined distance separated Gobos 8a and 8b from

the panel front faces 1a and 1b, and it has prepared.
[0072] The bottom extensions 80a and 80b of each gobos 8a and 8b have a clearance among each ramps 4a and 4b, and form the path which leads a wind to each panel front faces 1a and 1b. The bottom extensions 80a and 80b form an parallel field to the inclined plane of Ramps 4a and 4b, and it is made for the cooling wind which flows the clearance between these to tend to go to a panel front face.
[0073] Moreover, the bottom extensions 80a and 80b are prolonged exceeding Ramps 4a and 4b, and opening for introducing a cooling wind among these is formed.
[0074] If it does in this way, with Gobos 8a and 8b, a cooling wind can be taken in and the flow which goes to the both-sides front face of a panel can be formed. In addition, if it enables it to supply a cooling wind to opening specified by the bottom extensions 80a and 80b selectively using the compressed air etc., the bottom extensions 80a and 80b can act like the inlet port of a duct.
[0075] As mentioned above, although the operation gestalt of this invention was explained, the configuration of the ramp of a frame is not restricted to the configuration where it explained with the above-mentioned operation gestalt, but as long as the cooling wind supplied towards the periphery section of a display panel can be positively drawn on the surface of a display panel, it can be made into the various configurations where a cross section is shown, for example in drawing 10 (a) and (b).
[0076] Moreover, the display device of this invention may be appropriately used to various displays with effective drawing the cooling wind supplied towards the periphery section of a display panel on the surface of a display panel.
[0077]
[Effect of the Invention] According to this invention, by improving the configuration of a frame, it can show positively the cooling wind which flows the periphery section of a frame to the front face of a display panel, and, thereby, the cooling effectiveness on the front face of a panel can be raised. It becomes possible to cool the front face of a display panel effectively, without enlarging size of a display, if it does in this way.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the top view showing the layout of the components which constitute the liquid crystal projector concerning the operation gestalt of this invention.
[Drawing 2] It is the sectional view showing a part of liquid crystal projector concerning the operation gestalt of this invention.
[Drawing 3] It is drawing showing the configuration of the liquid crystal display component of the operation gestalt 1, and (a) is [a sectional view and (c of the side elevation by the side of optical incidence (b))] the side elevations by the side of optical outgoing radiation.
[Drawing 4] The gestalt shown in drawing 3 is drawing showing the configuration of the liquid crystal display component of another gestalt, and the side elevation of (a) by the side of optical incidence (b) is a sectional view.
[Drawing 5] It is drawing showing the configuration of the liquid crystal display component of the operation gestalt 2, and (a) is [a sectional view and (c of the side elevation by the side of optical incidence (b))] bottom end view.
[Drawing 6] It is drawing showing the configuration of the liquid crystal display component of the operation gestalt 3, and (a) is the sectional view where there was a side elevation by the side of optical incidence (b) along a sectional view, and (c) was the A-A line of (b).
[Drawing 7] It is drawing showing the configuration of the liquid crystal display component of the operation gestalt 4, and (d) of (a) is the sectional view where a sectional view and (c) are bottom end view, and the side elevation by the side of optical incidence (b) met the A-A line of (b).
[Drawing 8] It is drawing showing the configuration of the liquid crystal display component of the operation gestalt 5, and (a) is the sectional view where there was a side elevation by the side of optical incidence (b) along a sectional view, and (c) was the A-A line of (b).
[Drawing 9] It is the top view of the liquid crystal display component concerning another operation gestalt of this invention.
[Drawing 10] It is the sectional view of the liquid crystal display component concerning another

operation gestalt of this invention.

[Drawing 11] It is the sectional view showing the edge of the conventional liquid crystal display component.

[Description of Notations]

1 Liquid Crystal Panel
1a Optical incidence side front face
1b Optical outgoing radiation side front face
2 Frame
2a, 2b Ramp
10 Liquid Crystal Display Component
16 Polarizing Plate
20 Dichroic Prism
22 Projection Lens
30 Cooling Fan
32 Wind Guide Plate
34 Opening of Wind Guide Plate
36 Wind Introduction Section
38 Aluminum Chassis
40 Flexible Substrate
42 Opening of Flexible Substrate
44 Connection Terminal